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A SCIENTIFIC VIEW OF CONSCIOUSNESS.

SO many attempts have been made to give a clear explanation of consciousness that it may appear superfluous to make another; there is, however, a constant human desire to know everything new and reliable on the subject, and this desire seeks to be gratified. Consciousness is one of a great number of "mysteries" by which we are surrounded, it is like a "certain something in the air, that all men feel, but no man can describe," its mystery arises largely from its complexity and the smallness of our comprehension, and as long as we act upon the unscientific idea that belief is not to be controlled by facts or that we can safely believe without evidence, we shall be confused by such mysteries. The mode of action of any one of the senses, especially that of vision, is nearly as great a mystery as that of consciousness. The chief explanation of the large failure of attempts to explain consciousness is, that they have usually been made without the aid of sufficient familiarity with the fundamental principles or methods of science:—the entire history of mankind proves that without extensive and varied knowledge of science it is hardly possible to obtain truthful ideas of the mysteries of nature. Consciousness is a wider subject than that of the ordinary senses because it includes all kinds of feelings from all parts of the body. As the subject is large, only an outline of it is attempted in this article, and as it is complex, the article requires attentive reading.

I. DEFINITION OF CONSCIOUSNESS.

We cannot clearly understand a subject unless we define its chief terms; undefined terms are used as means of evasion in discussion:—a true definition of it must be one which agrees with all facts relating to the subject, and may be conveniently stated as a clear perception of existences within and around us. According to to a large amount and variety of scientific evidence, ordinary consciousness is essentially a high degree of activity of the cerebellum or "litttle brain," and this organ is generally recognised by physiologists as being the "sensorium" or seat of feeling. We have no proof that consciousness can exist without nervous substance.

Consciousness and unconsciousness differ only in degree, and merge into each other by imperceptible differences. Consciousness is a part of mental action, and the terms "consciousness" and "perception" are nearly synonymous: it is a complex nervous action superadded to vitality, thus trees live but do not feel; it is a part of life in all animals, and rudiments of it exist in certain plants. It is essentially the same in all nations and all ages; all human beings experience substantially the same joys, griefs, pains, and pleasures in consequence of possessing the same cerebral structures and being acted upon by the same general powers and circumstances; at the same time the varieties of consciousness are as numerous as those of human beings.

II. MYSTERY OF THE SUBJECT.

The subject of consciousness has been greatly mystified by an undue desire to know "the inmost nature of things," but this is beyond our powers; we cannot "realise" the "inmost nature" of any thing, simply because it is so extremely profound, and our consciousness and intellect are so very finite; however much we discover, there always remains a vast amount more to be found; our nearest approach to that of consciousness is, that it is a special kind of motion which only occurs in living nervous substance. To ask what it is "in itself" is an irrational desire; in such profound subjects we must be content to learn all we can, and wait for further discoveries. Its "first cause" is equally inscrutable, for the simple reason that in all cases there must be an earlier cause, and so on without end. When we know more deeply the nature of the senses we shall more nearly know that of consciousness, because the senses and their organs are the immediate basis of it.

It has also been mystified by an assumption of the existence of a "second self" within us, distinct from our ordinary "self," but the probably true explanation of this "second self" is the occasional separate excitement of one only of our two cerebral hemispheres. We know that memory, perception, observation, attention, comparison, inference, and imagination, are all more or less acts of consciousness:—we also know that by means of dreams, illusions, etc., and inferences from them, that similar phenomena frequently occur but are barely observed within us, and that these slightly noticed cerebral actions tend to influence our conduct in a similar manner to the fully noticed ones:—we have often a faint degree of consciousness of our dreams on waking, but such faintly conscious dreamy phenomena are far more consistently explained by unequal cerebral action than by the hypothesis of a "second self." Such sensorial actions are often unnoticed, either because they too feebly excite the cerebellum, or the latter is either too obtuse or too preoccupied to perceive them: but they are occasionally so strong and persistent in some persons as to haunt them after waking. Dreams are often fortuitous medleys of ideas uncontrolled by comparison and inference, and are probably produced by the cerebral circulation exciting latent imprints of the sensorium in an irregular manner:—they are not, however, always medleys, but are in rare cases consistent series of thoughts and tendencies to action automatically produced under undisturbed conditions. We have in a slender degree occasionally the power of observing and criticising our dreams during their occurrence, but only at great risk of the dreams themselves being interrupted and of this power being disconcerted by the dreams, and this indicates that the dreaming and observing organs are in some degree separate but very nearly related, similarly to the sensorial and cerebral hemispheres by means of their "commisures." Through deficiency of suitable knowledge the ordinary waking thoughts of some persons are much like those of dreamers. The idea of consciousness has been still further mystified by the assertion that it still exists in some occult form eternally after death:—but if the existence of myriads of "souls" in space is a reality, the omnipresent radiations in space should be affected, and we are far more likely to detect their existence by means of scientific appliances than by our unaided consciousness, because the former are very much more sensitive than the latter.

III. DEPENDENCE OF CONSCIOUSNESS UPON NATURAL CAUSES.

Consciousness depends upon a number of conditions and circumstances, the chief of which is the presence of nervous living matter in a state of motion. The fundamental cause of it is the natural energy of our environments acting through the senses, but the immediate cause is the action of the senses themselves. Nearly all parts of our body, and especially its outer surfaces, are supplied with sensory nerves, and the sensorium is automatically excited through these nerves by numberless external and internal influences; and as these influences are of various degrees of strength, and the sensorium varies greatly in sensitiveness, consciousness is of all degrees of intensity, varying from the faintest perception to the greatest pain or pleasure, from peaceful sleep to raving madness. Its degree depends upon the physical state of the brain, the extent of its excited surface, and the intensity and suddenness of the excitation:—it is the loudest sounds, the strongest lights, the greatest pains and pleasures, and the most sudden of all these, which most excite it; in inflammation of the brain or of its membranes the least sound or light excites it greatly. It is often increased when several senses are simultaneously excited, thus lightning accompanied by thunder is very impressive. The perception of optic images by the eye may be regarded as a part of consciousness.

Consciousness is aroused by a great variety of influences, usually by all those which excite the brain or senses, its most common cases being hunger, thirst, and desire. In consequence of the multitude of causes which affect it, it varies from minute to minute, and each man's brain is in a number of different conscious states in succession, thus the man asleep and awake, drunk and sober, are very different persons. In ordinary cases the actions of the two halves of the brain blend together similarly to those of the two eyes, but in some cases the same individual appears in inconsistent characters at different times in consequence of inharmonious cerebral action. The degrees of this variation of consciousness in the same human body has in some cases been so great that the "original self" and the "second self" have entirely forgotten each other, and the changes from one state of the sensorium to the other have happened suddenly:—such great changes as these nearly always occur in emotional persons, and are regarded as signs of insanity. As consciousness is not an independent entity, but an active sate of nervous substance, its changes in such extreme cases cannot be reliably ascribed to the existence of two different persons in the same body, but to inharmonious action of the two cerebral hemispheres. Great bodily changes cause great alterations of consciousness: the change from grub to butterfly must be an extreme one.

IV. MODE OF EXAMINING THE SUBJECT.

Further, the rise and fall of consciousness entails other changes, thus the series of cerebral alterations attending an act of perception does not end with it, but leads to other occurrences:—it gives rise to trains of thought, reflex muscular actions, changes in the viscera, etc., or its energy is stored up like the heat of the sun in coal, and accumulates in the system, ready to be expended in action when liberated. In such a very complex subject the human brain is too small to grasp all the phenomena, their causes, relations, and effects, and the best way to arrive at truth in it is not to accumulate a large number of complex personal narratives, but to examine it by the aid of such a theory as agrees with all known facts and all their logical consequences. A suitable theory is supplied by the great principles of universal causation, evolution, motion, radiation, automatism, action and reaction, etc. It has been proved, largely by means of the spectra of substances and by astronomy, that all bodies, human beings included, are in a state of incessant motion, both internally and in their masses, that they are in a state of continual change of motion, of increase and decrease, growth and decay; that these movements and variations of movement are the essential causes of other changes in all living and dead substances: that all bodies more or less automatically act and react upon each other; that even the different invisible movements in bodies influence each other, thus every substance, whether living or dead, is always sending rays of heat and of other forms of motion to, and receiving such rays from, all other substances, and is thus continually influencing, and being influenced by them; the sun, radium, and magnets are familiar examples:—we know that rays of light exert pressure on solid bodies; and it has been shown by experiments with a cube of lead weighing seventy-four hundredweight that a variety of substances emit rays which affect a voltic cell (see *Philosophical Magazine*, 1897). In these and many other ways every different substance and creature behaves as a different aggregate of movements and as a different machine.

V. DEPENDENCE OF CONSCIOUSNESS UPON NATURAL ENERGY.

We may conclude from these facts and a multitude of others that nervous matter is always moving:—that cerebral motion is essential to consciousness, that automatic action and reaction are universal, that the human machine is largely automatic, and that automatic action in the human body is essentially the same as that in inanimate substances. There is continued action and re-action between man and all things around and within him; all his organs act and re-act upon each other; we are all of us influenced by food, weather, our servants, neighbors, creditors, the tax-collector, by all who know us, and by all kinds of circumstances within and without, and we re-act upon them from birth until death. Our feelings influence our intellect and our intellect re-acts and restrains our feelings: we feel, and by reasoning we know; we know and consequently we feel.

Some of these powers act upon us without our directly perceiving it, thus by influence of food and air we grow, but we do not feel the act of growth; by that of gravity we are carried through space at the rate of more than eighty thousand miles an hour, without feeling it. Even our volition is no exception to automatic action and re-action, thus we cannot by an effort of will alone prevent feeling cramp, colic, or toothache. The chief natural energies are vastly stronger than man: under their dominion he is like "clay in the hands of the potter," they move him before he knows why, even when he commands he must first obey, and although action and re-action are equivalent in every case, stronger power universally overcomes weaker: in this way man submits to all sorts of pains and calamities, and individual consciousness is governed by national. We fancy that we are governed by a "spiritual ego" within us, because the effects we wish follow so certainly our volitional desires and we cannot detect their origin, but as we cannot create energy we only act when we are acted upon, as when our stored-up energy is transferred or set free by some unnoticed natural change. In nearly every act of volition there is some influence so feeble, or our attention is so preoccupied, that our consciousness does not perceive it, but that does not prove that it is a spirit producing energy out of nothing. The error of believing that "mind" is a spiritual entity is so extremely insidious and tenacious that it deceives millions, including many of the most learned persons. Natural energy acts throngh us as it does through all animate and inanimate bodies, and it is only when our volitions happen to agree with its operations that they succeed; usually we only try to carry them out when the natural conditions are favorable because we know that it is useless to try when they are not. But although we cannot directly overcome natural powers greater than our own, we are stimulated by our failure to indirectly render them subservient to our desires by the aid of suitable knowledge, and this is strikingly shown by the numerous triumphs of science and art.

VI. RELATION OF AUTOMATIC ACTION TO CONSCIOUSNESS.

Various parts of our nervous system may be automatically active without exciting the sensorium, thus the nerves which regulate our internal organs are always active, our lungs breathe automatically, the heart beats unceasingly, the stomach digests during day and night, each without exciting consciousness except when diseased, and we even walk to a large extent automatically. Each sense acts automatically when acted upon by its own special causes, and appears to have a locality of its own in the sensorium. Spontaneity and persistency of consciousness, so necessary to professional eminence, depend largely upon training, education, and state of bodily health. The great perfection of expression, direction, and sense-action, which occasionally occurs in our dreams shows how perfect even mere automatic brain-action may be when undisturbed.

Inanimate natural energy is the most fundamental prime-mover in human conduct; it acts whether we feel it or not: consciousness comes next, and intellect the last. We are usually impelled more powerfully by our environments, poverty, lack of food, etc., than by feeling, and more often by feeling and sentiment than by intellect; life is too short to allow us to reason out every action before performing it. Why is intellect so generally weaker than feeling? Simply because it is evolved out of it, and that during this transformation some energy is converted into heat and and lost by diffusion: we know that thinking makes the head hot, and that nearly all transformations of energy are attended by loss. That the origin of consciousness is automatic is proved by the fact that when all its causes and conditions are present and its preventives absent, we cannot by our strongest desire prevent its occurrence; thus we must feel the cold of winter and the heat of summer whether we are willing or not. Consciousness, similar to all other forms of motion, is subject to neutralisation and inhibition by opposing influences; one of the conditions of our being conscious of any particular feeling or idea is that the brain be not preoccupied by a contradictory or a stronger one; thus we cannot attend to a trifling matter whilst fully occupied by an opposite or a serious one; similarly a substance cannot be in two contradictory states, such as hot and cold, at the same instant. This inhibition of feelings and ideas by each other explains the seeming fortitude of warlike Indians, sectarian martyrs, and others, whilst being tortured; their brains being filled with stronger and opposite feelings and ideas.

Automatic physical action underlies prospective as well as immediate consciousness, "we live, and move, and have our being" in the ever-moving ether; probably everything within and around us, by its motion and properties, produces more or less permanent impressions upon our nervous ganglia; these impressions remain latent, and the strongly fixed ones are always ready to be excited by various causes. The number of such latent imprints must be enormous: it has been estimated that the total number of nerve-cells in the *grey* surface-matter of the human brain capable of receiving such imprints is about 2000 millions, but only a small proportion of these are considered to be used in dreams and conscious thoughts, the others being idle. Memory is aroused by the action of various external and internal influences upon these impressions: and during association of ideas, different parts of the cerebrum and sensorium act upon each other through an endless number of microscopically fine connecting nerve fibres which compose the *white* portions of the two organs. As nervous matter is a very soft solid substance it is specially fitted for receiving impressions, and as it is very mobile and the white nervous masses are full of nerve-fibres, it is highly capable of transmitting them. Of the multitudes of our bodily actions and surroundings continually existing and changing, only a very small proportion distinctly excite our consciousness, and the great bulk of them pass by without notice, though probably not without producing some latent impressions upon our sensorium; these impressions constitute the initiating material of our dreams and of many of our waking ideas.

VII. NERVE SUBSTANCE INDISPENSABLE.

That consciousness is really a nervous action is shown by the circumstance that where nervous matter first appears in the long series of living plants and animals there also consciousness commences: it is further proved by the fact that the greater the degree of excitability of the sensory nerves and ganglia the greater is that of consciousness. As it only occurs when the excitement of of the sensory-nerves and centres is sufficiently strong, it is essentially a certain degree of sensorial activity. It varies greatly in different individuals; the nerves of some persons are so sensitive that their consciousness, hopes, and fears, vary with each passing cloud. General consciousness is greater and more varied in man than in any other animal, and is more reliable in trained than in untrained persons.

VIII. LIMITATIONS OF ALL HUMAN POWERS.

Man is a very minute part of the universe (all mankind are only about a 100 million millionth part of the earth) nearly all his powers are extremely small in comparison with those of inanimate nature; his nervous system is only a part of his body, his consciousness only occurs in his brain, and fully only during his waking-state. Under the most favorable conditions his perception of sound only extends through a few octaves, and of light not beyond the mere red and violet rays of the solar spectrum. His power of scent is much less than that of the dog, of vision not equal to that of a hawk, and of rays of magnetism, wireless telegraphy, or gravitation, he has no direct perception. The smallness of his consciousness is chiefly due to that of his organism, and that of his intellect is partly occasioned by losses of energy during its transformations from that of his food to that of his judgments. During sound sleep none of his actions or surroundings excite his sensorium, and during his waking-state the greater portion of them are not perceived. He requires time to perceive things, because inertia of the organs has to be overcome, or their excitement to subside; certain periods of time are required to transmit nervous influence to the cerebellum, to feel a sensation, to think an idea, to compare ideas, to form a conclusion, or decide upon an action. It has been found by means of experiments that the period of time required to perform a single act of thought is about a twenty-fifth part of a second. We neither lose consciousness nor regain it all at once, we gradually fall asleep and we wake gradually from it, and consciousness increases by degrees as our various organs enter into action, similar to motion spreading through a large mass of machinery. We cannot instantly realise all the details of a landscape.

We cannot have all we want, nor simultaneously possess contradictory attributes:—in consequence of the smallness of his cerebellum, even the the most learned man is unable to fully imagine the infinite, the absolute, or the perfect: he fails to perceive the vastness of the universe, or his own immeasurable littleness or feebleness in it: of the immensity of time, space, or energy, he has barely a perception, he cannot even realise the idea of a million years, a million miles, or the millionth of an inch. This extreme narrowness of consciousness entails an immensity of ignorance which affects all our thoughts and actions and is a source of innumerable "evils": In consequence of ignorance we overvalue trifles which stimulate our feelings, and underestimate great things which do not excite us:—a great majority of mankind knows very little about their own bodies, and this ignorance largely results in producing disease, shortening human life, and limiting human progress and population.

In addition to the influence of *size* of the sensorium upon the extent and variety of consciousness, that of its *quality* must be important, because we know that favorable heredity, training, and education tend to produce intellectual ability, refined sentiment, and perception of truth; it is well known that a healthy state of the brain and well-balanced consciousness are necessary to proper conduct. Better quality may more than compensate for smaller quantity and surface of the brain, and a smaller brain may do more good work than a larger one. Great size and surface of brain promote ability by affording a larger receptacle for knowledge, whilst superior quality accompanies better selection and use of it; wisdom is a nobler possession than knowledge. Some persons of very great ability have had very large brains, and some who have possessed large brains have had very erroneous ideas through deficiency of truthful principles.

IX. UNRELIABILITY OF CONSCIOUSNESS.

Consciousness, when imperfectly corrected by training and knowledge, is essentially crude and unreliable, and often a dangerous faculty; it is subject to a great variety of illusions, delusions, and hallucinations: thus a stick seems bent when thrust obliquely into water, and the sun appears to revolve around the earth. The human sensorium occasionally sees, hears, and feels, things which do not exist, and which are merely illusions excited in it by natural causes, such as habit, expectancy, desire, nervous excitement, etc., thus we occasionally hear our alarm clock ring or a knock at our bedroom door, when they do not really occur; or a man whose leg has been cut off, still feels sensations of his toes. We all of us suffer more or less from uncorrected feeling, and the number of human errors, delusions, illusions, failures of memory, accidents and crimes, due to untrained consciousness, is immense. The frequency of disordered consciousness is shown by the great number of lunatics. The only fundamental remedy for these "evils" is discovery and diffusion of new knowledge.

Consciousness is largely modified by our dual anatomical structure, especially by that of our chief nervous ganglia. The human organism is largely double: its limbs and most of its internal organs are in pairs; the sense organs, brain, cerebellum, and spinal cord are each divided vertically into two similar organs or halves, and in each case the single organ or the half one usually acts in place of, supplements, or corrects, the actions of the other: thus a man having only one lung, kidney, or leg, may live:—we can hear better with two ears and see better with two eyes than with one. Similarly we feel and think more fully and correctly with the two halves of the sensorium and cerebellum than with one, provided they are alike and healthy; and it has been observed that "persons suffering from disease of one-half of the brain only, often lose the power of comparing and reasoning correctly." In consequence of the duality of its nervous system, "the chameleon is able to allow one side of its body to lie torpid in deep sleep, while the other side is perfectly awake," and as its two eyes and optic lobes can act independently it is able to look in opposite directions at the same instant.

Discordant action of the two halves of the human brain largely affords an explanation of the peculiar phenomena of the "second self," double consciousness, and somnambulism. The cerebral hemispheres are not always alike in size or condition, in some cases one is diseased, or is at intervals stronger or more excited than the other. In consequence of this occasional unbalanced power of the brain, the individual is at one period governed more in his thoughts and actions by one hemisphere than by the other, and at other periods the reverse, and his conduct is inconsistent.

The consciousness produced by comprehensive ideas is often less exciting than that due to small personal matters, because the feelings are not involved, and because the greatest truths are frequently inconspicuous:—whilst it is the noisy, violent, and sudden phenomenon which most excites, it is the long-continued, incessant, and feeble ones, which ultimately produce the greatest effect; and small habits, by long continuance form human character. It is similar throughout inanimate nature; given unlimited time, the smallest cause produces infinite effect: thus mountains are washed away by mere drops of rain.

Our unnoticed bodily changes bring us gradually to death; multitudes of persons die prematurely, or become insane by the slow progress of insidious disease, and this is one of the ways by which the powerful influences of nature limit the world's population. We exaggerate the effects of alcoholic over-drinking because they are so palpable to our consciousness, whilst we minimise the more serious ones of over-eating because it requires more intellect to perceive them. In various ways we live in a state of false security through the narrow limits of our sensorium and consciousness; thus national decay is so slow that many persons doubt its existence, or only perceive it after it has largely advanced. As we are largely compelled to be ignorant by circumstances and by our limited consciousness we cannot be fully expected to believe or understand the greatest conclusions of science, and hence we find many persons quite impervious to clear scientific truths. In the midst of all this the painful effects of ignorance compel us to seek knowledge, but even in producing new impressions on our sensorium by means of scientific research we do not actually create new knowledge but only evolve it out of the evidence existing within and around us, and had we sufficiently extensive and comprehensive faculties we might reliably predict all that will be from all that is:—we already do so in the subject of eclipses and others. Successful prediction is the most certain test of truth.

X. GENERAL BASIS OF CONSCIOUSNESS.

Consciousness is manifestly based upon the actions of the senses:—the senses are founded upon the mechanical, physical, chemical, and vital properties of their organs, and are intimately related to the great scientific principle of universal natural causation, the ever-present conditions of time, space, and motion, and to all the modes of motion, known as heat, light, electricity, radiation, etc. We are conscious because our sensorium and our organs of sense move, and they move because their excitants move, and the stronger the movements of the excitants and of our senses, the greater, usually is the degree of consciousness. We perceive things because they act upon and move us, and we move because we perceive; we are painfully moved by witnessing distress. Throughout nature motion is not created, but only transferred, transformed, diffused, or stored-up; the only cause of motion is some previous motion, and so on without end so far as we know; that which has no motion cannot move our senses nor our muscles. Human consciousness is excited by the same universal motion which incessantly moves all inanimate bodies. All life is motion, and the only way to keep alive is to keep in motion: when we fall asleep we lose movement and are less alive. Heat is a species of internal motion, and the human body produces about three times as much heat during the day as during the night when we are not conscious. All light, heat, and sound are vibrations, they affect our consciousness even when they appear to be uniform.

XI. RELATION OF CONSCIOUSNESS TO CAUSATION AND MOTION.

The relation of consciousness to motion and to change of motion is very profound: the fact that exclusion of light and sound quiets the brain, proves that cerebral movement is intimately related to them. Similar to every other action of material substances, consciousness is inseparable from universal natural causation; i. e., it always happens a minute period after its immediate cause, and this is owing to inertia of the sensorium, etc., having to be overcome:—to arouse it, a movement must be sufficiently fast, but not too rapid, thus the movement of the hour-hand of a watch is not immediately perceptible, and that of a very rapidly revolving axle is also not perceived. Simple unvarying motion has but little effect upon our sensorium; it is only when some sudden change of motion (which is itself a movement) occurs within or around us, and produces an alteration in that organ, that consciousness happens. A mother wakes when her infant cries, but a miller wakes when his mill stops; we only know two new shillings from each other when we can detect some slight difference between them. Very uniform influences make but little impression upon our consciousness; thus we cannot directly perceive the existence of time or space, the great velocity of the earth in its orbit, nor even the influence of atmospheric pressure or of gravitation upon us, and we only know with certainty of their existence by comparing impressions and drawing inferences from their differences. A perfectly uniform electric current is but little perceived, whilst even a feeble one, if slowly intermittent, produces a strong sensation; suddenly varying strong light also strains the sensorium. An electric current varying with immense frequency in opposite directions, as in Tesla's experiments, but little excites the sensorium, because each successive opposite wave neutralises the effect of the immediately previous one before the inertia of the nervous matter has been overcome. The inhibitory effect of opposite phenomena upon each other is universal, and indicates the essential mechanical nature of all action, whether conscious or unconscious.

The very foundation of consciousness, and of all human conduct, whether conscious or unconscious, moral or immoral, lies deep in the movements, properties, and capacities of bodies. All our actions, whether bodily or cerebral, appear to be capable of being represented as in harmony with a perfect mechanical system: and parallels of all of them may be found in mechanics, but the labor of showing this clearly would be great. The neutralising and conflicting effects of opposite movements of masses or molecules upon each other, are essentially similar to the inhibition of feelings and ideas by contradictory ones. If all material bodies were perfectly alike in properties, they would have very little effect upon each other, but as they are all different, and as no two men are entirely alike there is continual conflict. It is differences of conscious impressions and ideas that largely keep mankind in motion, and which cause collision between the advancing and retarding sections, the intelligent and the ignorant, the scientific and sectarian: and we know that bodies moving at different rates or in different directions, cannot remain united.

XII. RELATION OF CONSCIOUSNESS TO CHEMICAL ACTION.

That consciousness is within the domain of scientific experiment is proved by the fact that it can be increased, decreased, or destroyed, by various natural agents; thus alcohol, strong tea, quinine, strychnine, or rise of bodily temperature, increase it:—chloroform, morphia, chloral, trional, etc., decrease it;—whilst a small quantity of prussic acid, or a concussion of the brain, destroy it altogether:—great thirst, or cerebral inflammation produces intense consciousness. That it is intimately related chemically to the oxygen dissolved in the arterial blood of the brain is shown by the circumstances that during excitement of mania, there is great oxidation and waste of brain, the products of which, in form of phosphates, are found in the urine:—the rapid waste of brain also during deep meditation limits the duration of our power of attention. One of the methods of reducing consciousness is by diminished the oxygen in the circulation: thus many animals promote sleep by covering their noses and breathing the impure deoxygenised air from their lungs. The circulation of duly oxygenised blood through our arteries during the waking-state is a constant cause or condition of feeling, thought, and action. The great fact that consciousness is dependent upon many natural conditions proves that it is itself natural; and we are not morally justified in fixedly believing without evidence that it is supernatural.

Farther:—there is a systematic order of relation between it and other natural phenomena:—thus the sense-organs are evolved out of material food by vital processes, the senses out of the particular structures of those organs, consciousness out of the senses, comparison out of dual acts of consciousness, and inference and reasoning out of comparison. During this series of changes the stored-up energy of food is transformed into vital energy of the sense-organs, that into the energy of the senses; the energy of the senses becomes that of consciousness, and that of consciousness turns into that of reasoning-power through the medium of comparison, which is itself essentially dual perception. In this order energy of intellect is produced, and some heat is lost during the process.

XIII. SENSORIAL IMPRESSIONS.

The sensorium is a storehouse of memory, and an incomplete register of our pains and pleasures. The latent impressions made upon it are fixed by repetition and habit, ready to be revivified by associated ideas, and by the oxygen dissolved in the blood, Much of our happiness and misery depends upon these imprints; if they are untruthful they are liable to produce pain because they contradict each other, and those persons who have a mixture of truthful and untruthful ones, often do not know what course to pursue.

Multitudes of persons suffer in this manner, and are driven to seek consolation in irrational hopes and unprovable ideas, by the clamor of their desires. Under the influence of cerebral excitement and memory malicious persons are rendered liable to suffer from uncontrollable malicious dreams and ideas, and in some cases have even committed murder and suicide whilst under their influence. The foregoing and a multitude of other "evil" effects due to unregulated consciousness, show the necessity of truthful ideas, proper food, pure air, judicious exercise, and pure blood, to healthy consciousness. It is well known that gout makes the sensorium irritable.

XIV. DEPENDENCE OF MORALITY UPON CONSCIOUSNESS.

The relation of consciousness to morality is very extensive. "As we feel, so we act," unless intellect prevents it. All moral acts are conscious ones, and the conscious state is a requisite condition of all moral action; we are not considered morally responsible for acts performed by us whilst we are unconscious, nor even for those we commit during dreams or somnambulism, nor whilst we are insane:—the compulsory influence of natural causes is usually recognised in such cases, but how far a person is allowed to injure his fellows even when compelled to do so by internal or external circumstances, differs in every different case and depends upon a variety of conditions. Our feelings compel us not only to commit "evil" but also to resist it.

Simple automatic consciousness, uncorrected by knowledge and inference, is frequently a great deceiver, thus we often wrongly estimate magnitudes, numbers, distances, periods, volumes, and weights; we make mistakes with regard to existences, events, persons, forms, colors, and appearances, and this gives rise to innumerable false beliefs, lawsuits, sectarian and political conflicts, wars, diseases, accidents, and crimes. Our senses and feelings afford us a mixture of truth and error, from which we have to sift the truth by means of experiments, comparison, inference, and analysis. The actions of all our limbs, organs, and faculties, are similarly more or less unreliable, and even our most highly corrected scientific knowledge is frequently only approximate. We are all of us in different degrees "blind leaders of the blind," and a large proportion of the pains we suffer and inflict is due to the circumstance that we are kept in ignorance by our very limited powers. Similar to moths flying into the flame of a candle, so we are compelled by our instincts to hasten unknowingly toward disease, insanity, crime and death. Untruthful consciousness misleads millions, and we are compelled by natural influences to expend much of our time in elaborating and diffusing untruths and illusions, and but little in discovering new knowledge.

XV. DEPENDENCE OF BELIEF UPON CONSCIOUSNESS.

Consciousness and belief are closely allied, as we feel, so we usually believe, especially in difficult subjects: internal and external influences cause our feelings, and these, with or without correction by intellect, determine our opinions; we cannot always stay to investigate. The great advantage of consciousness in causing us to believe and act is its quickness, and that of intellect is its greater reliability; it needs more time to reason than to feel because reasoning requires us to compare two or more feelings or impressions. Consciousness alone produces only blind belief, but reason produces reliable conviction. As reason is frequently weaker than feeling, it is our higher faculties rather than our lower ones which most require stimulating. Consciousness is fallible because it does not compare its impressions but acts immediately upon them; it determines our conduct more frequently than our intellect because it acts wholly automatically; but when it has been properly trained it is often our best guide and produces similar results. Automatic consciousness is like a "ready reckoner," it saves us the trouble of calculating:

> "Reason, however able, cool at best,
> Cares not for service, or but serves when prest,
> Stays till we call, and then not often near
> But honest instinct comes a volunteer."
> —Pope.

XVI. LIMITED SENSITIVENESS OF HUMAN CONSCIOUSNSSS.

Our senses and consciousness are very dull in comparison with inanimate agents, a wave of light travels 700,000 times faster than one of nerve-energy, a photographic surface detects thousands of heavenly bodies which we cannot even see with the aid of a telescope;

a bolometer is estimated to be about 200,000 times more sensitive to heat than our skin; a galvanometer can show the influence of one part of chlorine in 500,000 million parts of water, whilst our taste cannot with certainty distinguish one part in a million; a photograph is a much more extensive, minute, and certain record than our brain; and even the process of reasoning can be mechanically performed by means of Jevous's "logical machine." We depend very largely upon the properties of scientific appliances for our beliefs; the microscope, spectroscope, telescope, photography, the kinematograph, etc., have brought a new world of impressions into our consciousness, and as such instruments, processes, and methods are free from personal prejudice, and vastly surpass in delicacy and reliability our senses and perception, it appears highly desirable that they be used for testing the idea of telepathy and the hypothesis of the existence of human spirits in space.

XVII. RELATION OF CONSCIOUSNESS TO TRUTHFULNESS.

The relations of the sensorium and consciousness to truthfulness are of a most practical kind; immovable false beliefs, fixed impressions without evidence, and ignorance or lack of cerebral impressions, are dangerous, and contradictory ones destroy peace of mind. As the sensorium of criminals and insane persons is moved and governed by the same natural influences and laws as those of the wisest men, we are all of us compelled to believe more or less untruth, and are largely unable to get rid of false impressions. Consciousness includes both truthful and untruthful impressions; we often believe, though we cannot really know, that which is untrue; and without proper and sufficient evidence we cannot with certainty know anything. The properly trained sensorium can contain a much larger number of impressions than the untrained one, because its impressions do not contradict each other, and are systematically united together by truthful principles. The phenomena of false belief, unprovable belief, belief without evidence, delusions and illusions, belong to the subject of mental disorders; and the question as to how far we are morally justified in believing serious statements without evidence, or believing and diffusing unprovable statements in such matters, belongs to the subject of scientific morality. The moral duty of improving our minds by receiving the truths of science is already to some extent recognised. The hopes of the human race depend largely upon scientific correction and extension of consciousness:—the discovery of new knowledge is the starting-point of human progress, and as the possession and application of great truths is the chief remedy for the pains and "evils" of life, original scientific research is a very practical matter, but the process entails a vast amount of labor.

As consciousness and all our faculties are so extremely limited in comparison with the contents and powers of the universe, it is not surprising that only a few persons can fully realise the idea of universal natural causation, or "whatever is, must be" under all the conditions and circumstances, and consequently the necessity of crime, "evil," and conflict. In the continual presence of so much pain and misery in nearly all directions, it is almost beyond human power to even faintly imagine the still further truth that "whatever is, is right," yet both these conclusions must be come to if we scientifically and thoroughly examine the subject.

The chief claims of the foregoing "view of consciousness" upon our attention are:—it agrees with the principle of universal natural causation and with all well-verified knowledge:—it involves no real self-contradictions:—by its agreement with these, and by its self-consistency it gives us confidence in the natural powers which govern us, and imparts greater confidence, courage, and carefulness to all our thoughts and actions:—it affords us consolation by showing that our trials, if properly accepted, are often our greatest blessings;—and by its truthful explanation of the real cause of the shortcomings of mankind it makes us reasonably tolerant towards all men:—but as this view is a comprehensive one, it cannot be accepted, nor its advantages secured without the labor of acquiring sufficient suitable knowledge.

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